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UNITED STATES DEPARTMENT OF AGRICULTURE  
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National Poultry Improvement Plan

SELECTING BIRDS FOR U.S.R.O.P. MATINGS

The breeder has a greater opportunity to apply his skill in the selection of males and females for use in U.S.R.O.P. matings than in any other poultry-breeding operation. In making such selections he must choose birds that will most likely be the best breeders to use in the single male pens. Such decisions entail a meticulous effort in summarizing and studying the necessary records. The handling and transferring of the birds also requires considerable time if sufficient observations are made on all individual members of each family considered.

REPEAT MATINGS

If possible, matings should be repeated that have progeny performing better than the flock average. The value of such matings may be improved by adding sisters of the hens whose progeny gave good performance and removing the hens with poor progeny records. If brothers of the proved males are available, the best individuals should also be used in some of the single-male matings.

SISTERS' PERFORMANCE

The sib-test of a cockerel is the same as the progeny test of his sire and dam. The males used in U.S.R.O.P. matings for the first time should be selected on the basis of their sisters' performance, as well as their pedigree and physical qualities. The longer the selection can be delayed on the cockerels that have sisters entered for the first time as U.S.R.O.P. candidates, the more information there will be available on rate of production, egg quality, viability, and other desired characters.

NUMBER OF U.S.R.O.P. MATINGS

At least ten U.S.R.O.P. breeding pens should be established in order to provide for adequate selection. Each pen should contain as many females as one good male will fertilize satisfactorily. Generally, at least fifteen can be used if the male is at all satisfactory. If more females are placed in each pen than are needed for candidate flock replacement, those females giving the best hatchability as shown by the first hatch should be noted, and all their chicks saved for at least eight weeks. The selected females will, in all probability, have sufficient daughters in an eight to ten week hatching period for adequate progeny tests.

If the number of desirable qualified U.S.R.O.P. females is limited, candidate females with good beginning records and of good families may be used in U.S.R.O.P. single-male candidate matings. This will enable the breeder to attain progeny test records a year earlier.

Temporary single-male candidate mating pens can be established easily within the regular trapnest house for candidates. These single-male mating pens can be removed at the end of the period for hatching pedigreed chicks -- the birds remaining in the trapnest house.

### CHANGING COCKERELS

A female should be mated to at least two males the first year that she is used as a breeder. If she is mated to two males, her progeny from both sires will give a satisfactory test of her value as a breeder. Moreover, when the males are changed, twice as many cockerels can be progeny tested. Only five days need be lost in producing U.S.R.O.P. chicks when males are changed. It is recommended that the pen should be left unmated for five days during which time the chicks can be pedigreed as from the original male. The chicks can be pedigreed as from the second male five days after he is placed into the pen. If the male is artificially mated to each female in the pen, only two days need be lost. It is advisable to artificially mate the new set of males the second time, then leave them in the pen to mate naturally. This practice gives assurance that all chicks produced were fertilized by the new males.

### MEASURING HATCHABILITY USING MASS-MATED CANDIDATES

A preliminary measure of hatchability can be obtained from the U.S.R.O.P. candidates in mass matings. These candidates mate more or less at random with a large number of males from several different families. It is not necessary to hatch the eggs in the usual way in pedigree baskets. If the eggs are marked during trapping a tally can be made of those failing to hatch, in the Remarks column of the U.S.R.O.P. Monthly Trapnest Record Form. A record should be made also of all eggs too low in quality for setting as well as those failing to hatch and compared with the total laid for a period of one month or more.

### SELECTION PRESSURE

It is generally agreed that the cockerels to be progeny tested should be the selected best individuals from the best families. In other words, the selection pressure should be as great as possible on an individual and family basis. The smaller the percentage of the families used in the selection of cockerels, the greater the selection pressure. For example, if ten sire families are available and cockerels are used from only four, the selection pressure on the sire family basis is much greater than if cockerels are used from six or eight sire families. If cockerels are used from all ten sire families, the selection pressure is limited to that obtained by selecting the best individual from each pen.

Some breeders follow a system of using a cockerel from each pen in the next pen of a series of rotation. Such a system permits no selection pressure on the sire family basis. These breeders usually do select the cockerel from the best dam of the pen. This practice gives a great amount of selection pressure on the basis of the dam's family. In other words, if a pen has fifteen females and a cockerel is selected from only one, only one out of fifteen is used. The selection pressure on the basis of the dams is 93 per cent.

The more progressive breeders select cockerels from only their outstanding sire families and the best dam of each sire family. Such cockerels are usually mated to females of more than one family with various degrees of relationship to the sire's family.

### SYSTEMS OF MATING

Some system of mating should be used that will permit as much selection on a family basis as possible. If distinct lines are maintained, the selection is limited to the quality of the birds within each line, therefore, the number of lines should be limited. One recommended system is to establish two distinct lines, which can be maintained by using males and females from the best families within each line.

Such a system as this will enable the breeder to make reciprocal crosses between the two lines. The progeny from these reciprocal crosses should give a more vigorous chick for commercial purposes than those from each line.

### INBREEDING

Cockerels should be selected from at least four sire families to prevent too much undesired inbreeding. With four sire families represented and with the usual large number of females used as breeders, the coefficient of inbreeding is not likely to be more than 4 per cent. This may be compared with a coefficient of inbreeding of  $12\frac{1}{2}$  per cent for one-half brother and sister matings and 25 per cent for full brother and sister matings. If, in addition to using four or more sire families, a definite effort is made not to mate relatives, the amount of inbreeding will be of no consequence.

Some breeders make up some of their single-male matings so they will have a few of the females related to the male's family. This is desired in order to determine the undesirable factors that may be uncovered by inbreeding. Breeding closely to a certain family is known as line breeding. Most breeders "hedge" in their inbreeding efforts by using a high proportion of very distantly related females in each pen, thereby producing more outcross matings than inbred matings.



Inbred matings can be made very conveniently by adding to the U.S.R.O.P. matings for trial purposes, a few of the full sisters or the dam of the cockerel heading each pen. Three or more sisters can be selected on the basis of their individual production record previous to the breeding season. If the cockerels were selected on the basis of their sisters' performance, the sisters themselves will be equally as reliable as breeders on a partial-year trapnest record. If the inbreeding results are undesirable it will be apparent during the hatching and rearing season and before any of the progeny are entered as candidates for U.S.R.O.P. Even if the inbreeding is not continued to the second generation, considerable information will be obtained that will aid in making regular matings. A cockerel mated back to his dam or full sisters gives the most complete progeny test possible.

If a breeder is equipped and has a satisfactory broiler market, he may find it practicable to make inbred matings in the fall and put chicks out as broiler chicks for two to four weeks of hatching. Since most of the detrimental factors show up during the hatching and growing period the best U.S.R.O.P. hens and cockerels could be identified as future breeders.

#### SUMMARY

- (1) Repeat matings that show better than average progeny performances.
- (2) Use cockerels from families that have a large number of good producing sisters.
- (3) Establish at least ten single-male matings.
- (4) Change cockerels in each pen, thereby progeny testing twice as many males and each female with two males.
- (5) Obtain a preliminary measure of hatchability on the mass-mated candidates.
- (6) Select cockerels from four or more of the best sire families and also the best dams of each sire family.
- (7) Develop and follow a system of mating that permits maximum selection pressure on a sire family basis.
- (8) Make some inbred matings on a trial basis.

